

Design Element			Manual Section	Design Values (By Type of Area)		
				Suburban	Intermediate	Built-up
Design Controls	Design Forecast Year		40-2.02	20 Years	20 Years	20 Years
	*Design Speed (km/h) (1)		40-3.0	Curbed: 60-80 Uncurbed: 70-90	Curbed: 60 Uncurbed: 80	Curbed: 50-60
	Access Control		40-5.0	Partial Control / None	None	None
	Level of Service		40-2.0	Des: B; Min: C	Des: C; Min: D	Des: C; Min: D
	On-Street Parking		45-1.04	None	Optional (2)	Optional (2)
Cross Section Elements	Travel Lane	*Width (3)	45-1.01	Curbed: 3.6 m Uncurbed: 3.6 m	Curbed: Des.: 3.6 m; Min.: 3.3 m Uncurbed: 3.6 m	Curbed: Des.: 3.6 m; Min.: 3.3 m
		Typical Surface Type (4)	Chp. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	*Curb Offset (5)		45-1.02	0.6 m	0.6 m	0.6 m
	Shoulder	*Paved Width (6)	45-1.02	3.0 m	2.4 m	1.8 m
		Typical Surface Type (4)	Chp 52.	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	Cross Slope	*Travel Lane (7)	45-1.01	2%	2%	2%
		Shoulder	45-1.02	4%	4%	4%
	Auxiliary Lanes	Lane Width	45-1.03	Des: 3.6 m; Min: 3.3 m	Des: 3.6 m; Min: 3.3 m	Des: 3.3 m; Min: 3.0 m
		Curb Offset (8)		0.3 m	0.3 m	0.3 m
		Shoulder Width		Des: 3.0 m; Min: 0.6 m	Des: 2.4 m; Min: 0.6 m	Des: 1.8 m; Min: 0.6 m
		Typical Surface Type (4)	Chp. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	TWLTL Lane Width		46-5.0	Des: 4.8 m; Min: 4.2 m	Des: 4.8 m; Min: 4.2 m	Des: 4.2 m; Min: 3.6 m
	Parking Lane Width		45-1.04	N/A	Des: 3.6 m; Min: 3.0 m (9)	Des: 3.6 m; Min: 3.0 m (9)
	Sidewalk Width (10)		45-1.06	1.5 m with 1.5 m Buffer (Des)	1.5 m with 1.5 m Buffer (Des)	Varies; 1.8 m Min
	Bicycle Lane Width (11)		51.7.0	Curbed: 1.5 m Uncurbed: Shld. Width +1.2 m	Curbed: 1.5 m Uncurbed: Shld. Width +1.2 m	Curbed: 1.5 m
	Clear Zones		49-2.0	(12)	(12)	(12)
	Typical Curbing Type (where used) (13)		45-1.05	Sloping / Vertical	Sloping / Vertical	Sloping / Vertical
	Side Slopes (Uncurbed) (14)	Cut	45-3.0	Foreslope	6:1 (15)	6:1 (15)
		Ditch Width		1.2 m (16)	1.2 m (16)	N/A
		Backslope		4:1 for 6.0 m; 3:1 Max. to Top (17)	4:1 for 6.0 m; 3:1 Max. to Top (17)	N/A
		Fill		6:1 to Clear Zone; 3:1 Max. to Toe	6:1 to Clear Zone; 3:1 Max. to Toe	N/A
	Side Slopes (Curbed)	Cut (Backslope)	45-3.0	(18)	(18)	(18)
		Fill		12:1 for 3.6 m; 3:1 Max. to Toe	12:1 for 3.6 m; 3:1 Max. to Toe	12:1 for 3.6 m; 3:1 Max. to Toe

*Controlling design criteria (see Section 40-8.0). Des: Desirable; Min: Minimum.

**GEOMETRIC DESIGN CRITERIA FOR TWO-LANE URBAN ARTERIALS
(New Construction / Reconstruction)**

Table 53-7

Design Element			Manual Section	Design Values (By Type of Area)				
				Suburban	Intermediate	Built-Up		
Bridges	New and Reconstructed Bridges	*Structural Capacity (19)	Chp. 60	HS-20	HS-20	HS-20		
		*Clear Roadway Width(20)	45-4.01	Uncurbed: Full Paved Approach Width Curbed: Full Approach Curb-to-Curb Width				
	Existing Bridges to Re-main in Place	*Structural Capacity	Chp. 60	HS-20	HS-20	HS-20		
		*Clear Roadway Width	45-4.0	Uncurbed: Travelway Plus 0.6 m on Each Side; Curbed: Full Approach Curb-to-Curb Width				
	*Vertical Clearance (Arterial Under) (21)	New and Replaced Overpassing Bridges (21a)	44-4.0	5.05 m	5.05 m (21b)	5.05 m (21b)		
		Existing Overpassing Bridges		4.30 m	4.30 m	4.30 m		
		Sign Truss / Pedestrian Bridges (21a)		New: 5.35 m; Existing: 5.20 m	New: 5.35 m; Existing: 5.20 m	New: 5.35 m; Existing: 5.20 m		
	Vertical Clearance (Arterial over Railroad) (22)		Chp. 69	7.00 m				
Alignment Elemets	Design Speed			50 km/h	60 km/h	70 km/h	80 km/h	90 km/h
	*Stopping Sight Distance		42-1.0	65 m	85 m	105 m	130 m	160 m
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	U: 195 m SU: 170 m	U: 235 m SU: 205 m	U: 275 m SU: 235 m	U: 315 m SU: 270 m	U: 360 m SU: 315 m
		Stop Maneuver		155 m	195 m	235 m	280 m	325 m
	Intersection Sight Distance, -3% to +3% (27)		46-10.0	P: 105 m SU: 135 m	P: 125 m SU: 160 m	P: 150 m SU: 185 m	P: 190 m SU: 235 m	P: 230 m SU: 280 m
	*Minimum Radii for e _{max} = 4% / 6%		43-2.0	80 m / 75 m (23a)	130 m / 120 m (23a)	185 m /170 m (23a)	230 m (23b)	305 m (23b)
	*Superelevation Rate (24)		43-3.0	Up to e _{max} =6%			e _{max} =8%	
	*Horizontal Sight Distance		43-4.0	(25)				
	*Vertical Curvature (K-values)	Crest	44-3.0	7	11	17	26	39
		Sag		13	18	23	30	38
	*Maximum Grade	Level	44-1.02	8%	7%	6.5%	6%	5.5%
		Rolling		9%	8%	7.5%	7%	6.5%
	Minimum Grade (26)		44-1.03	Desirable: 0.5% Minimum: 0.3% (Curbed); 0.0% (Uncurbed)				

* Controlling design criteria (see Section 40-8.0). U: Urban; SU: Suburban.
See notes at bottom of Table 53-2 for approval authority for Level One design exception requests.

GEOMETRIC DESIGN CRITERIA FOR TWO-LANE URBAN ARTERIALS (New Construction/Reconstruction)

Table 53-7 (Continued)

GEOMETRIC DESIGN CRITERIA FOR TWO-LANE URBAN ARTERIALS
(New Construction/Reconstruction)
Footnotes to Table 53-7

- (1) Design Speed. The minimum design speed should equal a) the minimum value from the table, b) the anticipated posted speed limit after construction or c) the state legal limit on non-posted highways, whichever is greater. The legal limit in urban districts is 50 km/h. Based upon an engineering study, these speeds may be raised to an absolute maximum of 90 km/h.
- (2) On-Street Parking. In general, on-street parking is discouraged.
- (3) Travel Lane Width. For arterials on the National Truck Network, lane widths must be 3.6 m.
- (4) Surface Type. The pavement type selection will be determined by the INDOT Pavement Design Engineer.
- (5) Curb Offset. The curb offset should be 0.6 m. In restricted locations, a continuous vertical curb may be offset 0.3 m, and a sloping curb offset may be zero. Vertical curbs should not be used unless $V < 80$ km/h.
- (6) Shoulder Width. The following will apply:
 - a. The shoulder is paved to the face of guardrail. The desirable guardrail offset is 0.6 m from the effective usable shoulder width. See Section 49-5.0 for more information.
 - b. The table values apply to paved shoulder widths. Desirably, an additional 0.3 m of compacted aggregate will be provided.
- (7) Cross Slope (Travel Lanes). Cross slopes of 1.5% are acceptable on existing bridges to remain in place.
- (8) Curb Offset for Auxiliary Lanes. On curbed sections, the offset may be zero.
- (9) Parking Lanes. Where the parking lane will be used as a travel lane during peak hours or may be converted to a travel lane in the future, the width should be equal to the travel lane width plus a 0.3 m offset to the curb (if present). Cross slopes for parking lanes are typically 1% steeper than the adjacent travel lane.
- (10) Sidewalk Width. Buffers less than 0.6-m wide are not allowed. If no buffer is provided, the sidewalk width should be 1.8 m.
- (11) Bicycle Lane Width. The widths in the table are in addition to the width of parking lanes, if present. See Section 51-7.0 for additional details.
- (12) Clear Zones. The following will apply:
 - a. Facilities with Vertical Curbs. The clear zone will be measured from the edge of travel lane or will be to the right-of-way line, whichever is less. No clear zone is required where there is 24-hour parking.
 - b. Facilities with Sloping Curbs or without Curbs. The clear zone will vary according to design speed, traffic volumes, side slopes and horizontal curvature.
 - c. All Curbed Facilities. There should be an appurtenance-free area as measured from the gutter line of any curb.
 - d. Values. See Section 49-2.0 for specific clear zone values.
- (13) Curbing Type. Vertical curbs can only be used with design speeds less than 80 km/h.
- (14) Side Slopes (Uncurbed). Values in the table are for new construction. See Section 45-3.0 and Section 45-8.0 for more information. For reconstruction

projects, see Section 49-3.0.

- (15) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.
- (16) Ditch Widths. In rock cuts, a "V" ditch should be used. See Section 45-8.0.
- (17) Backslopes. Backslopes for rock cuts will vary according to the height of the cut and geotechnical factors. See Section 45-8.0 for typical rock cut sections.
- (18) Side Slopes (Curbed) Cut. Typically, a shelf or sidewalk will be present immediately behind the curb before the toe of the backslope. The minimum width of a shelf will be 1.8 m; where sidewalks are present, the toe of the backslope will typically be 0.6 m beyond the edge of sidewalk. See Section 45-3.0 for more information.
- (19) Structural Capacity (New and Reconstructed Bridges). The following will apply:
 - a. All bridges on facilities with greater than 600 trucks per day should be checked using the Alternate Military loading.
 - b. All State highway bridges within 25 km of a Toll Road Gate must be designed for Toll Road Loading.
 - c. All bridges on "Extra Heavy Duty Highways" must be designed for the Michigan Train truck loading configuration.
 - d. See Chapter Sixty for additional information on the loading configurations.
- (20) Width (New and Reconstructed Bridges). See Section 59-1.0 for more information on bridge widths.
- (21) Vertical Clearance (Arterial Under). The following will apply:
 - a. Table values include an additional 150-mm allowance for future pavement overlays.
 - b. In highly urbanized areas, a minimum clearance of 4.30 m may be provided if there is at least one route with a 4.90-m clearance.
 - c. Vertical clearances apply from usable edge to usable edge of shoulders.
- (22) Vertical Clearance (Arterial Over Railroad). See Chapter Sixty-nine for additional information on railroad clearances under highways.
- (23) Minimum Radii. The following will apply:
 - a. Based on $e_{\max} = 4\%$ or 6% and low-speed urban street conditions.
 - b. Based on $e_{\max} = 8\%$ and open-road conditions.
- (24) Superelevation Rate. See Section 43-3.0 for values of superelevation based on design speed and radius. See Section 43-3.0 and the INDOT *Standard Drawings* for information on superelevation requirements.
- (25) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance which applies at the site. In some cases, the SSD values for trucks will apply. See the discussion in Section 43-4.0.
- (26) Where adjacent sidewalks are present, the maximum desirable grade is 5%.
- (27) Intersection Sight Distance. For left turn onto a 2-lane road. P = Passenger car; SU = single unit truck. See Figure 46-10G for values for combination trucks.